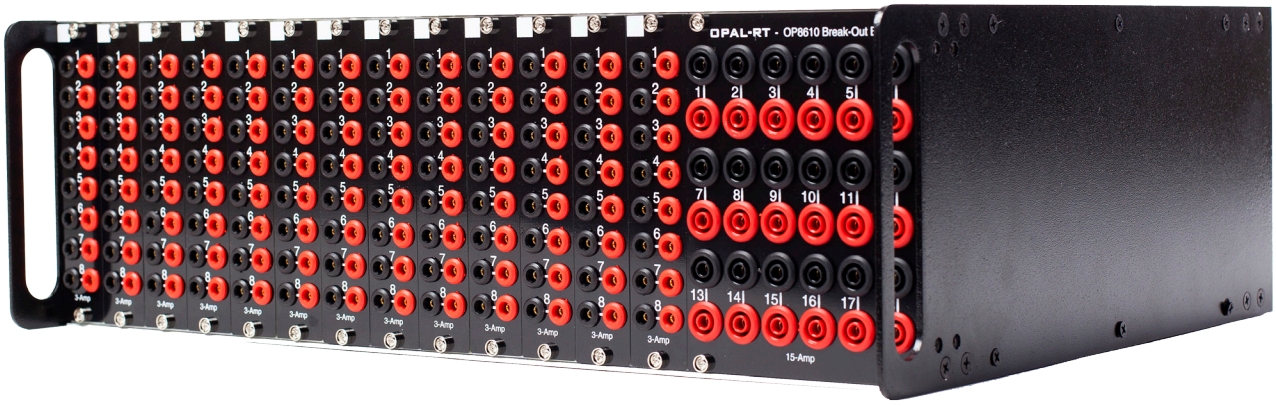
OPAL-RT



Break-Out Box
User Manual

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BREAK-OUT BOX

INTRODUCTION

The Opal-RT break-out box provides easy access to all signals on the I/O connectors. Using the OP8610 breakout box, you manually generate circuit faults (open circuit and short circuit) using jumpers to either break contact or connect a circuit. You can analyse and test electronic equipment by specifically testing each component and its connection.

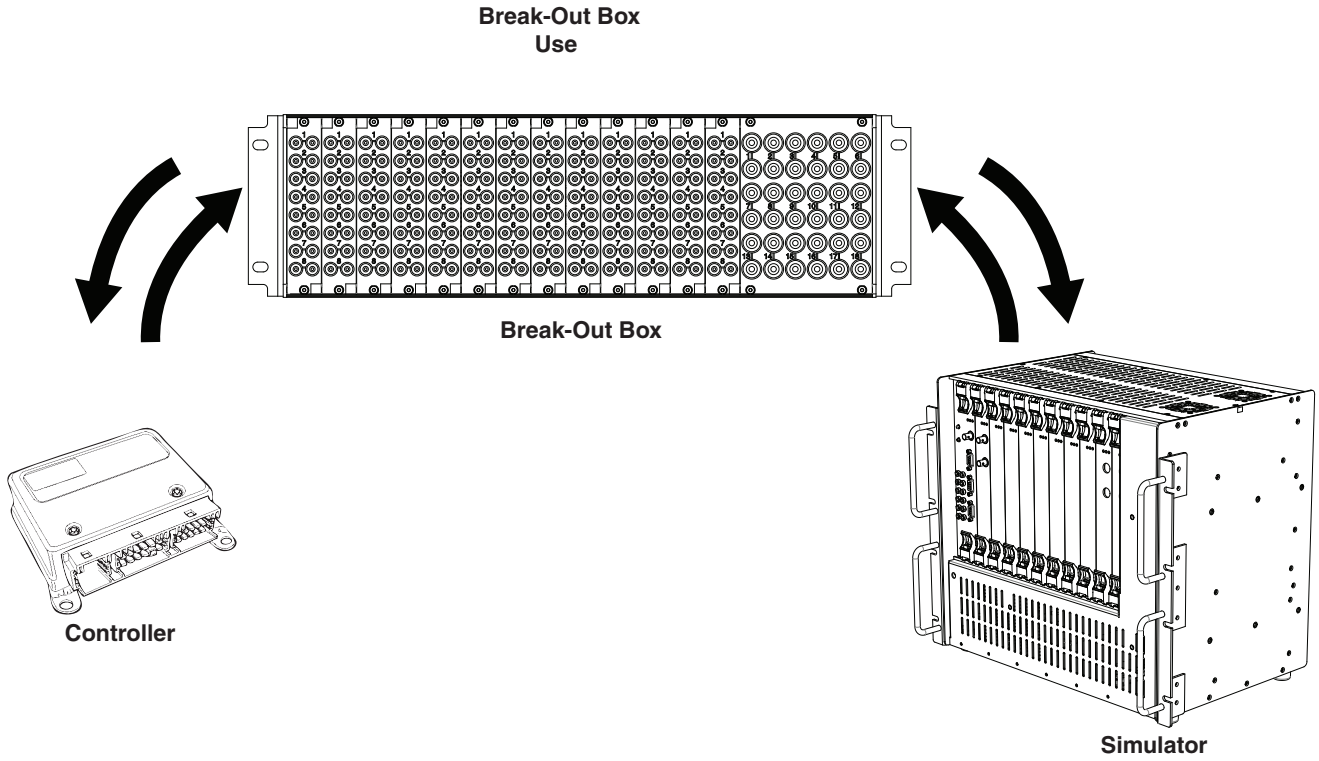


Figure 1: Break-out box use illustration

By installing the break-out box as a link between the unit under test (ECU, motor controller, etc.) and the simulator, you can insert a fault at any point in the test to assess how the unit reacts to the fault. You can check and reconnect signals without changing the existing cable harness.

Features

- Up to 104 low current circuits (3 amp)
- Separate plug in modules (group of 8)
- Up to 18 high current circuits (15 amp)

PIN ASSIGNMENTS

Front Low Current Connector Diagram

Each pair of jacks connects from a channel on the unit under test to a channel on the simulator.

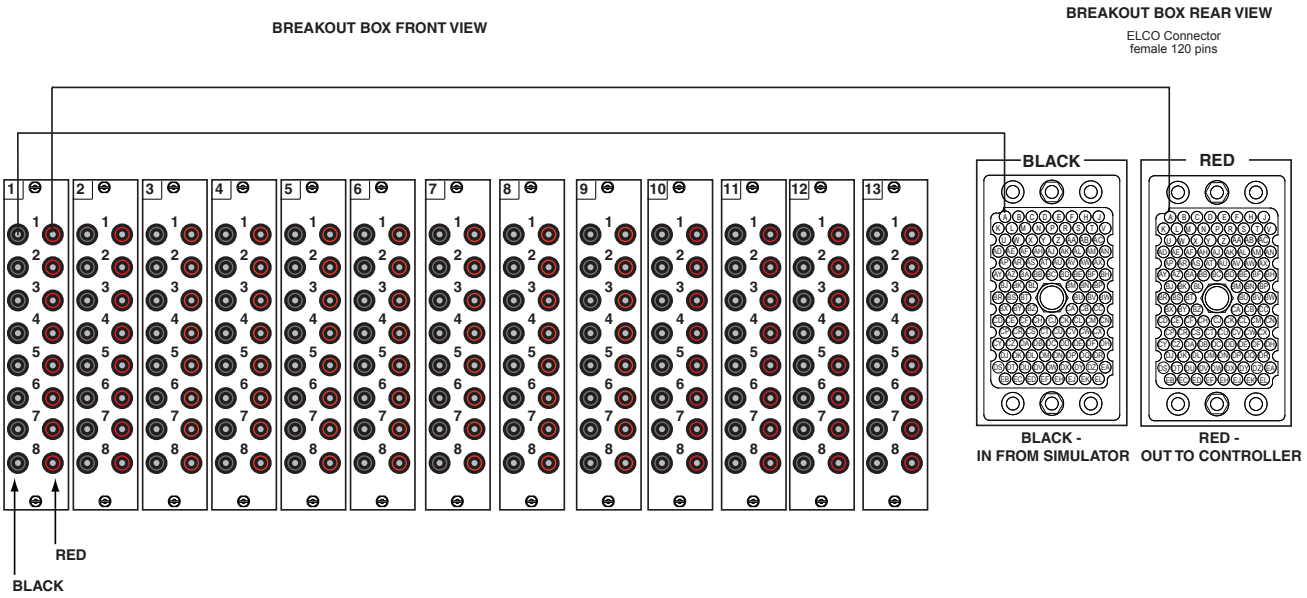
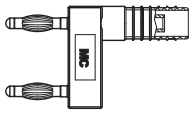


Figure 2: Front banana jacks path to ELCO connector

Faults are manually created by inserting a jumper into the desired channel jacks. The jumper used for the break-out box are supplied.



In the event that replacements are needed, we recommend using the original part (SKS2-12L/1SA/N, 12mm jumper, 2mm), or an equivalent.

As a general guideline, cables from the Break-Out Box to the controller should be connected on the RED jacks and cables from the simulator to the Break-Out Box should be connected to the BLACK jacks.

Rear High Current Connector Diagram

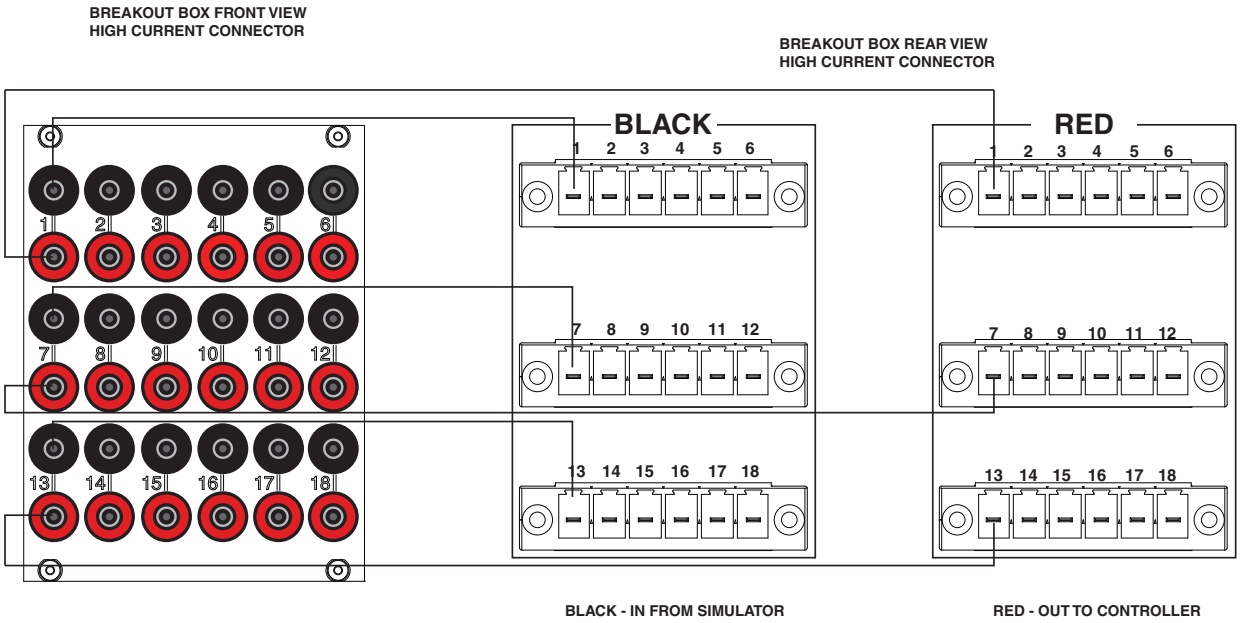
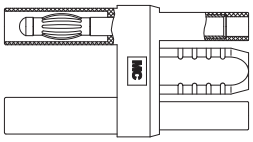

BREAKOUT BOX FRONT VIEW
HIGH CURRENT CONNECTOR
BREAKOUT BOX REAR VIEW
HIGH CURRENT CONNECTOR
BLACK
RED
1 2 3 4 5 6
7 8 9 10 11 12
13 14 15 16 17 18
BLACK - IN FROM SIMULATOR
RED - OUT TO CONTROLLER

Figure 3: High current banana jack path to Phoenix connector

Faults are manually created by inserting a jumper into the desired channel jacks. The jumper used for the break-out box are supplied.

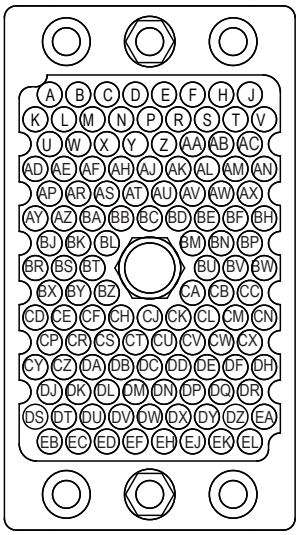


In the event that replacements are needed for the high current jumpers, we recommend using the original part (SKS4-19L/1 19mm jumper, 4mm), or an equivalent.

Low Current Connector Pin Assignments

The following table lists the signals available on the front, low current connector and on the system's two rear ELCO connectors.

Red (left) breakout pin	Red (right) ELCO connector	Black (right) breakout pin	Black (left) ELCO connector
1-1	A	1-1	A
1-2	B	1-2	B
1-3	C	1-3	C
1-4	D	1-4	D
1-5	E	1-5	E
1-6	F	1-6	F
1-7	H	1-7	H
1-8	J	1-8	J
2-1	K	2-1	K
2-2	L	2-2	L
2-3	M	2-3	M
2-4	N	2-4	N
2-5	P	2-5	P
2-6	R	2-6	R
2-7	S	2-7	S
2-8	T	2-8	T
3-1	U	3-1	U
3-2	V	3-2	V
3-3	W	3-3	W
3-4	X	3-4	X
3-5	Y	3-5	Y
3-6	Z	3-6	Z
3-7	AA	3-7	AA
3-8	AB	3-8	AB
4-1	AC	4-1	AC
4-2	AD	4-2	AD
4-3	AE	4-3	AE
4-4	AF	4-4	AF
4-5	AH	4-5	AH
4-6	AJ	4-6	AJ
4-7	AK	4-7	AK
4-8	AL	4-8	AL
5-1	AM	5-1	AM
5-2	AN	5-2	AN
5-3	AP	5-3	AP
5-4	AR	5-4	AR
5-5	AS	5-5	AS
5-6	AT	5-6	AT
5-7	AU	5-7	AU
5-8	AV	5-8	AV
6-1	AW	6-1	AW
6-2	AX	6-2	AX
6-3	AY	6-3	AY
6-4	AZ	6-4	AZ
6-5	BA	6-5	BA
6-6	BB	6-6	BB
6-7	BC	6-7	BC
6-8	BD	6-8	BD
7-1	BE	7-1	BE
7-2	BF	7-2	BF
7-3	BH	7-3	BH


A B C D E F H J
K L M N P R S T V
U W X Y Z AA AB AC
AD AE AF AH AJ AK AL AM AN
AP AR AS AT AU AV AW AX
AY AZ BA BB BC BD BE BF BH
BJ BK BL BM BN BP
BR BS BT BU BV BW
BX BY BZ CA CB CC
CD CE CF CH CJ CK CL CM CN
CP CR CS CT CU CV CW CX
CY CZ DA DB DC DD DE DF DH
DJ DK DL DM DN DP DQ DR
DS DT DU DV DW DX DY DZ EA
EB EC ED EF EH EJ EK EL

Red (left) breakout pin	Red (right) ELCO connector	Black (right) breakout pin	Black (left) ELCO connector
7-4	BJ	7-4	BJ
7-5	BK	7-5	BK
7-6	BL	7-6	BL
7-7	BM	7-7	BM
7-8	BN	7-8	BN
8-1	BP	8-1	BP
8-2	BR	8-2	BR
8-3	BS	8-3	BS
8-4	BT	8-4	BT
8-5	BU	8-5	BU
8-6	BV	8-6	BV
8-7	BW	8-7	BW
8-8	BX	8-8	BX
9-1	BY	9-1	BY
9-2	BZ	9-2	BZ
9-3	CA	9-3	CA
9-4	CB	9-4	CB
9-5	CC	9-5	CC
9-6	CD	9-6	CD
9-7	CE	9-7	CE
9-8	CF	9-8	CF
10-1	CH	10-1	CH
10-2	CJ	10-2	CJ
10-3	CK	10-3	CK
10-4	CL	10-4	CL
10-5	CM	10-5	CM
10-6	CN	10-6	CN
10-7	CP	10-7	CP
10-8	CR	10-8	CR
11-1	CS	11-1	CS
11-2	CT	11-2	CT
11-3	CU	11-3	CU
11-4	CV	11-4	CV
11-5	CW	11-5	CW
11-6	CX	11-6	CX
11-7	CY	11-7	CY
11-8	CZ	11-8	CZ
12-1	DA	12-1	DA
12-2	DB	12-2	DB
12-3	DC	12-3	DC
12-4	DD	12-4	DD
12-5	DE	12-5	DE
12-6	DF	12-6	DF
12-7	DH	12-7	DH
12-8	DJ	12-8	DJ
13-1	DK	13-1	DK
13-2	DL	13-2	DL
13-3	DM	13-3	DM
13-4	DN	13-4	DN
13-5	DP	13-5	DP
13-6	DR	13-6	DR
13-7	DS	13-7	DS
13-8	DT	13-8	DT

Table 1: Low current connector pin assignments

High Current Connector Pin Assignments

The following table lists the signals available on the front, low current connector and on the system's two rear ELCO connectors.

Red (left) breakout pin	Red (right) Phoenix connector	Black (right) breakout pin	Black (left) Phoenix connector	Signal Name / Channel (space reserved for user notes)
1	Top	1	Top	
2	Top	2	Top	
3	Top	3	Top	
4	Top	4	Top	
5	Top	5	Top	
6	Top	6	Top	
7	Middle	7	Middle	
8	Middle	8	Middle	
9	Middle	9	Middle	
10	Middle	10	Middle	
11	Middle	11	Middle	
12	Middle	12	Middle	
13	Bottom	13	Bottom	
14	Bottom	14	Bottom	
15	Bottom	15	Bottom	
16	Bottom	16	Bottom	
17	Bottom	17	Bottom	
18	Bottom	18	Bottom	

Table 2: High current connector pin assignments

Low and High Current Connector Requirements

Both low and high current connectors require specific male connectors. The part numbers provided are for reference purposes only and may differ according to supplier and country.

	Part Number	Description
Low Current Connector	EDAC 516-120-000-101	120 pin connector with screw
	EDAC 516-230-512	Connector cover
	EDAC 516-290-590	Crimp pins
High Current Connector	1804946, PC 4/6-ST-7,62	Screw terminal, male
	1840159, PCC 4/ 6-ST-7,62	Crimped pin terminal, male

SPECIFICATIONS

Product name	**Break-Out Box**
Part number	OP8610
Number of channels	Low current: 104 channels, 1A, 3A, 5A (or 8A TBD) High current: 18 channels, : 10A, 15A, (or 20A TBD)
Voltage range	0-30 Vdc
Form factor	3 U
Dimensions	13.33 x 48.26 x 30.8cm HxWxD (5.25” x 19” x 12.125”)
I/O connector	Low current: Elco 120 pin, SEB2-R 2 mm banana jack with 12 mm jumper High current: Phoenix connector, SEB4-R 4mm banana jack with 19 mm jumper
Operating temperature	10 to 40 ºC (50 to 104ºF)
Storage temperature	-55 to 85ºC (-67 to 185ºF)
Relative humidity	10 to 90%, non condensing
Maximum altitude	2,000 m (6562 ft.)

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